WHAT IS CLAIMED IS:

1. A process for co-producing HMD and ACN from ADN, wherein the HMD contains less than 200 ppm THA, said process comprising the steps of:

(1) contacting ADN and hydrogen in the presence of a hydrogenation catalyst to produce a reaction product that comprises HMD, ACN, THA, and unreacted ADN;

(2) distilling the reaction product to provide a distillate that comprises HMD and THA;

(3) contacting the distillate with hydrogen in the presence of a hydrogenation catalyst, thereby providing a hydrogenation product that comprises HMD and HMI, said hydrogenation product containing less than 200 ppm THA; and

(4) distilling the hydrogenation product to provide a final distillate that comprises HMI and a bottoms that comprises HMD that contains less than 200 ppm THA and is substantially free of HMI.

2. The process of Claim 1 wherein the hydrogenation catalyst of step (3) is Raney Nickel or Raney Cobalt.